fragments of dark rich brown standing out slightly above the general mass of the calculus. These fragments, in size and appearance, bore a close resemblance to the crystals in a coarse-grained porphyritic rock.

The common monkey-bezoars vary much in colour and shape. I have seen them of the size of large filberts, curiously convoluted and cordate in shape, with a smooth, shining surface of a pale olive-green hue. Mr. A. R. Houghton once showed me one which was an inch and a half long, and shaped like an Indian club. It was of a dirty greenish colour, perfectly smooth and cylindrical; and it had become aggregated around a portion of a sumpitan dart, which appears to have penetrated the animal's stomach, and, being broken off short, subsequently served as the nucleus for the formation of a calculus. The same gentleman had in his possession two Landak stones, one of which bore a close resemblance to a block in shape, and was of a bright green colour; and the second was of a rich chocolate-brown, and could best be likened in form to a constable's staff. One porcupine-stone, which was opened, was found to be a mere shell full of small brown shavings like shred tobacco.

The part of the island which produces these stones in greatest abundance seems to be, by a coincidence of native reports, the district about the upper waters of the Baluñgan (Batang Kayan). The story is, that the head waters of this river are cut off from its lower course by an extensive tract of hills beneath which the river disappears, a report by no means unlikely if the country be, as is probable, limestone. The people of the district have no communication with the lower course of the river, and are thus without any supply of salt. In lieu of this necessary they make use of the waters of certain springs, which must be saline mineral springs, and which the Kayans call "Suñgan." These springs are also frequented by troops of the red monkeys before mentioned; and the Bezoars are most constantly formed in the stomachs of these animals, "through their drinking the saline water." The hunters lie in wait about such springs; and, so runs the report, on the animals coming down to drink, they are able to guess with tolerable certainty, from external signs, which of the monkeys will afford the Guliga; and they forthwith shoot such with their sumpitans. I have this account, curious in more ways than one, from several quite independent sources.

In concluding these brief notes, I may remark that the widespread idea of the medicinal virtue of these concretions would lead us to suppose that there is some foundation for their reputation.—*Journal of the Straits Branch of the Royal Asiatic Society*, 1880, p. 56.

On the Histology of the Pedicellariæ and of the Muscles of Echinus sphæra, *Forbes.* By MM. P. Geddes and F. E. Beddard.

Although our knowledge of the general form and of the calcareous parts of the pedicellariæ of the Sea-Urchins is now nearly com-

plete, thanks to the researches of O. F. Müller, Valentin, Perrier, A. Agassiz, Wyville Thomson, and several other naturalists, the information furnished by authors as to the histology of the soft parts of these organs is not equally exact. In the hope of giving more precision to the ideas on this subject, we have studied in detail the pedicellariæ of the large Urchin, *Echinus sphæra*, Forbes; and we will describe in a few words the principal results of the investigation.

On the ophiocephalous pedicellaria of Valentin the three adductor muscles, arranged in the form of a triangle, are attached, as is well known, to the calcareous apophyses of the three valves; but the fibres which unite the head of the pedicellaria to the club of the stem are not inserted upon calcareous parts, but terminate in an extremely remarkable fashion. Most of them are bent suddenly upon themselves before arriving at the level of the calcareous parts, and thus form a series of loops or meshes.

Two bundles only are prolonged further, interlace with the semicircular arcs of the valves, and terminate freely in a small tuft of meshes in the middle of the muscular triangle.

Quite distinct and separate from these bent fibres, alternating with them, and external to the calcareous parts, we find three parts of a still more curious structure. These are a sort of grilles or gratings, formed of fibres repeatedly bent, composing a series of meshes. These organs are not attacked by dilute acetic acid; they have the aspect of elastic tissue; and it seems probable that they function as antagonists of the adductor muscles, and serve to open the valves, somewhat like the ligament of an acephalous mollusk.

The tridactyle and gemmiform pedicellariæ contain these grilles; but they are very difficult to find, in consequence of their extreme delicacy. The fibres of the stem are not bent upon themselves, but attach themselves directly to the calcareous parts.

The head of the gemmiform pedicellaria is an extremely complicated organ. There is a gland outside of each valve; it is covered with two layers of muscular fibres and with a cylinder epithelium. These pedicellariæ are perhaps organs of urtication, for their calcareous valves terminate in a needle-point; or they may be organs for the secretion of mucus, as Mr. Sladen thinks, who has recently described the histology of this kind of pedicellaria in *Sphærechinus granularis* (Lam.)*.

At the commencement of histological researches the observations upon the structure of the muscles of the Echinodermata were always completely contradictory. Wagner, Siebold, and Johannes Müller described these muscles as being unstriped; Valentin, on the contrary, maintained that the muscles of the lantern and of the spines of the Urchin are striped; and De Quatrefages saw a striation upon the longitudinal muscles of *Synapta*. Baur contradicted these observations, whilst Leydig described a longitudinal and transverse striation in *Echinus* and *Holothuria*. Finally, in the last

* Ann. & Mag. Nat. Hist., August 1880.

memoir on this subject, that of L. Frédéricq*, on the muscles of the lantern of *Echinus sphæra*, their striation is again denied. How are we to explain this utter confusion?

By treating the muscles of the Urchin with different reagents and making a considerable number of preparations we have seen all the phenomena described by these authors. Frequently the adductor muscles of the valves of the pedicellariæ are distinctly striped; frequently also they do not show the least trace of striation. The same fact may be observed with the muscles of the lantern; for we have preparations which contain the simple fibres of Wagner and Frédéricq side by side with others of which the striation is as evident as in Valentin's drawings. Moreover by passing along a single fibre we very frequently find all possible gradations between the most distinct striation and its complete absence.

Our colleague, Mr. Haycraft, has just proposed a new theory upon the structure of the voluntary muscles†. In his view the fibrils are not simple cylinders, but they are slightly constricted at small intervals; and he asserts that their striation does not indicate a histological differentiation, but is simply an optical phenomenon produced by the unequal refraction that the light undergoes in traversing the fibril.

Without wishing to pronounce an opinion upon this theory from a general point of view, and without affirming that the striation of the muscles of the Echinodermata is due to the same cause as that of the muscles of the higher animals, we are convinced that the irregularity of the striation in the *Echinus* may be explained in the same way.

The fibres of the lantern show constrictions in perfect correspondence with the transverse striæ; when these constrictions follow one another very rapidly the striæ also approach each other; and when they become more widely separated the striæ show the same irregularity. Lastly the striæ and the constrictions disappear together.

It is probable, as has already been suspected, that the striation stands in some relation to the state of contraction of the muscles; but we hope to make fresh observations before pronouncing an opinion upon this question.—*Comptes Rendus*, February 7, 1881, p. 308.

On the Formation of the Blastoderm in the Araneida.
By M. A. Sabatier.

The mode of formation of the blastoderm in the Araneida has given rise only to a small number of publications, the data and conclusions of which are contradictory. The phenomenon presents two distinct phases: the first terminates in converting the egg into a meroblastic ovum with multiple cicatriculæ; the second includes the discoidal segmentation of each of the cicatriculæ, so as to form a simple and continuous layer of blastodermic cells.

* Arch. de Zool. Expér. 1877.
† Proc. Royal Soc., February 1881.